

-24-

CLAIMS

1. A composition comprising a conjugate of a photosensitiser and a bacteriophage.
- 5 2. A composition according to claim 1, wherein the bacteriophage is a staphylococcal bacteriophage.
3. A composition according to claim 1 or 2, wherein the photosensitiser is covalently linked to the bacteriophage.
4. A composition according to any of claims 1 to 3, wherein the  
10 photosensitiser is chosen from Porphyrins, phthalocyanines, chlorins, bacteriochlorins, phenothiaziniums, phenazines, acridines, texaphyrins, cyanines, anthracyclins, pheophorbides, sapphyrins, fullerene, halogenated xanthenes, perylenequinonoid pigments, gilvocarcins, terthiophenes, benzophenanthridines, psoralens and riboflavin.
- 15 5. A composition according to claim 4, wherein the photosensitiser is tin (IV) chlorin e6 (SnCe6).
6. A composition according to any of the preceding claims, wherein the bacteriophage is chosen from phage 53, 75, 79, 80, 83,  $\phi$ 11,  $\phi$ 12,  $\phi$ 13,  $\phi$ 147,  $\phi$ MR11, 48, 71,  $\phi$  812, SK311,  $\phi$ 131, SB-I, U16, C<sub>1</sub>, SF370.1, SP24, SFL, A1, ATCC  
20 12202-B1, f304L,  $\phi$ 304S,  $\phi$ 15,  $\phi$ 16, 782, P1clr100KM, P1, T1, T3, T4, T7 MS2, P1, M13, UNL-1, ACQ, UT1, tbaID3, E79, F8, pf20 B3, F116, G101, B86, T7M, ACq, UT1, BLB, PP7, ATCC 29399-B1 and B40-8.
7. A composition according to claim 6, wherein the bacteriophage is phage 75 or phage  $\Phi$ 11.
- 25 8. A composition according to any of the preceding claims, wherein the concentration of the photosensitiser is from 0.01 to 200  $\mu$ g/ml.
9. A composition according to any of the preceding claims, wherein the concentration of the bacteriophage is from  $1 \times 10^5$  to  $1 \times 10^{10}$  pfu/ml.
10. A composition according to any of the preceding claims, which  
30 further comprises a source of Ca<sup>2+</sup> ions, preferably calcium chloride.

11. A composition according to any of claims 1 to 10, in the form of a solution in a pharmaceutically acceptable carrier.
12. A composition according to any of claims 1 to 11, wherein the composition further comprises one or more of a buffer, salt, antioxidant, preservative,  
5 gelling agent or remineralisation agent.
13. A method of killing bacteria, comprising  
(a) contacting an area to be treated with a composition according to any of the preceding claims, such that any bacteria present bind to the photosensitiser-bacteriophage conjugate; and  
10 (b) irradiating the area with light at a wavelength absorbed by the photosensitiser.
14. A method according to claim 13, wherein the bacteria are staphylococcus, particularly MRSA, EMRSA VRSA, hetero-VRSA or CA-MRSA.
15. A method according to any of claims 13 or 14, wherein the light is  
15 laser light or white light.
16. A method according to claim 15, wherein the laser light is from a helium neon gas laser.
17. A method according to any of claims 15 or 16, wherein the laser light has a wavelength of from 200 to 1060nm.
- 20 18. A method according to any of claims 15 to 17, wherein the laser has a power of from 1 to 100mW and a beam diameter of from 1 to 10mm.
19. A method according to claim 19, wherein the light dose of laser irradiation is from 5 to 333 Jcm<sup>-2</sup>.
20. A method according to claim 15, wherein the light dose of white light  
25 is from 0.01 to 100 kJ/cm<sup>2</sup>.
21. A method according to any of claims 15 to 20, wherein the duration of irradiation is form one second to 15 minutes.
22. A method according to any of claims 13 to 21, wherein the composition is present in or on the area to be treated at a concentration of from  
30 0.00001 to 1% w/v.

-26-

23. Use of a composition according to any of claims 1 to 12, for treatment of the human or animal body.

24. Use of a composition according to any of claims 1 to 12, in the manufacture of a medicament for treatment of bacterial infection.

5        25. Use according to claim 24, wherein the bacterial infection is *S. aureus*, particularly MRSA, EMRSA, VRSA, hetero-VRSA or CAMRSA.

26. Use of a bacteriophage as a targeting agent in photodynamic therapy (PDT).

10       27. Use according to claim 26, wherein the bacteriophage is a staphylococcal phage.

28. A composition according to any of claims 1 to 12, substantially as described in the Examples.

29. A method according to any of claims 13 to 22, substantially as describe in the Examples.

15       30. A use according to any of claims 23 to 27, substantially as described in the Examples.